

Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT Lockheed Shipbuilding
2929 16th Avenue S. W.
Seattle, WA 98134
Attn: John Dislers

LABORATORY NO. 76619

DATE May 13, 1982

P.O. #FKM4X357B

REPORT ON GRIT

SAMPLE IDENTIFICATION Submitted on 5-10-82 and marked "Sandblasting Grit"

TESTS PERFORMED AND RESULTS:

This material was analyzed in accordance with 40 CFR 261.24 for EP Toxicity with results as follows:

	<u>concentration, mg/L</u>	<u>Maximum concentration, mg/L</u>
Arsenic	0.3	5.0
Barium	3	100
Cadmium	<.02	1.0
Chromium	<.1	5.0
Lead	1.3	5.0
Mercury	<.005	0.2
Selenium	0.2	1.0
Silver	<.1	5.0

Key

< denotes "less than"

USEPA SF



1561004

Respectfully submitted,

LAUCKS TESTING LABORATORIES, INC.

J.M. Owens
J. M. Owens

USEPA SF



1175453

JMO:ks



This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

45189

BEND
HERE

ENCLOSURE 9

BEND
HERE

PRP CODE #30
R-0004

Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT Lockheed Shipbuilding Corp.
2929-16th Avenue S. W.
Seattle, WA 98134
ATTN: Ed Cifra

LABORATORY NO. 79918

DATE April 5, 1983

P.O. #FKM6U228B

REPORT ON

MATERIAL

SAMPLE
IDENTIFICATION

Submitted 3/23/83 and marked as shown below:

TESTS PERFORMED
AND RESULTS:

- 1) Grit Blast YR-1 3/22/83
- 2) Pangborn, Under Pier Waste Sample 3/22/83

1

Flast Point, Pensky Martens
Closed Cup, °F

66.

Sample #2 was analyzed in accordance with 173-303 WAC, State of Washington, Department of Ecology, with results as follow:

	<u>concentration, mg/L</u>	
	<u>2</u>	<u>MCL*</u>
Arsenic	<0.2	5.0
Barium	<0.5	100.
Cadmium	0.02	1.0
Chromium	<0.1	5.0
Lead	<0.1	5.0
Mercury	<0.005	0.2
Selenium	0.3	1.0
Silver	<0.1	5.0



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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

PAGE NO. 2

LABORATORY NO. 79918

Lockheed Shipbuilding Corp.

Key

< indicates "less than"

*MCL = Maximum Contamination Level allowed

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO: bg



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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT Lockheed Marine
2929-16th Ave. SW
Seattle, WA 98134
ATTN: Bill Petryk

LABORATORY NO. 83605

DATE February 25, 1984

PO #FKM6U228B

REPORT ON COPPER SLAG SANDBLAST

SAMPLE
IDENTIFICATION

Submitted 2-14-84 and identified as shown below:

Copper Slag Sandblast Grit

TESTS PERFORMED
AND RESULTS:

Sample was analyzed in accordance with 40 CFR 261.24 for EP Toxicity with results as follow:

	<u>concentration, mg/L</u>	<u>MCL*</u>
Arsenic	L/0.2	5.0
Barium	L/1.	100.
Cadmium	L/0.02	1.0
Chromium	L/0.1	5.0
Lead	L/0.2	5.0
Mercury	L/0.005	0.2
Selenium	L/0.2	1.0
Silver	L/0.1	5.0

*MCL = Maximum Concentration Allowed by Regulation

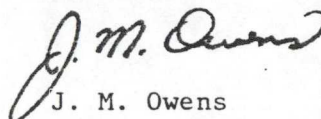
Key

L/ indicates "less than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

cc: Accounts Payable


J. M. Owens

JMO:vb



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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT

Lockheed Marine
2929 16th Avenue SW
Seattle, WA 98134
ATTN: Ed Cifra

LABORATORY NO.

85462

DATE

Aug. 8, 1984

REPORT ON

SAND BLAST GRIT *40 I*

PO #FRM6U228B

SAMPLE
IDENTIFICATION

Samples submitted 7-20-84 and identified as shown below:

TESTS PERFORMED
AND RESULTS:

- 1) Tub Skid
- 2) Sand Blast Shelter

Samples were analyzed in accordance with 40 CFR, Part 261.24 for EP Toxicity, with results as shown below:

	concentration, mg/L		
	1	2	MCL
Arsenic	L/0.2	L/0.2	5.0
Barium	2.	2.	100.
Cadmium	L/0.02	.03	1.0
Chromium	L/0.1	L/0.1	5.0
Lead	L/0.2	L/0.2	5.0
Mercury	L/0.005	L/0.005	0.2
Selenium	L/0.2	L/0.2	1.0
Silver	L/0.1	L/0.1	5.0
Copper	0.08	0.77	—
Zinc	11.	4.4	—

Key

MCL = Maximum Contamination Level allowed per regulation.

L/ = Less than

cc: Accounts Payable

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens
J. M. Owens

JMO:rtv



This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

Lockheed Shipbuilding
and Construction Co.
Page 2
April 4, 1983

In regards to a chemical analysis, we can offer the following:

Si O ²	48.24%
Fe ² O ³	.97%
Fe O	18.10%
AL O ³	9.05%
CA O	18.48%
Mg O	2.90%
Cu	.10%
Mn	.22%
Free Silica	None
Arsenic	None

Ray, the rail car of premium material should be in your yard by the 13th of April. If I can be of any further assistance, please feel free to contact me.

As I mentioned to you, I would also like to be present for the screen testing procedure on that car. I'll keep in touch.

Very truly yours,

KLEEN BLAST DIVISION

Mark Gadsby smc
Mark Gadsby
Director of Marketing

MG: smc

INTERDEPARTMENTAL COMMUNICATION

TO Paul Koshiyama

DEPT./
ORGN.

4330
1100

BLDG./
ZONE

103

PLANT/
FAC.

1

DATE

2/7/84

6-25-85
Bill Baldwin, I trust that
this is still our
policy? Lane

FROM J. T. Lane

DEPT./
ORGN.

4330
1100

BLDG./
ZONE

312

PLANT/
FAC.

3

EXT.

5575

SUBJECT: ARSENIC ANALYSIS, R. A. BARNES CO. COPPER SLAG FROM ANACONDA, MONTANA; MY IDC DATED 1/31/84, SAME SUBJECT

The results of the arsenic tests made on three copper slag shipments received in January of this year indicate that arsenic levels are above LSCC specifications for this toxic metal. The test results ranged from 0.1 to 0.5 percent and averaged nearly 0.3 percent.

As stated in my previous IDC, it is essential that copper slag used for abrasive blasting be as free from heavy metals contamination as possible. The LSCC specification is designed to minimize any environmental contamination that may result from our abrasive blasting operations.

In the past we have required that an analysis of the slag be submitted to us prior to being approved for purchase. Since the results of the tests submitted by R. A. Barnes Co. are now in question, when a change of supplies is being investigated, we should specify that the analysis be performed by a certified laboratory and verified by an identical analysis at a laboratory of our choice.

The slag must also pass the E.P. toxicity tests as defined in the federal R.C.R.A. law title 40CFR, and Washington State Dept. of Ecology regulations, WAC-173-303:

With regards to the Anaconda slag, I recommend we discontinue the purchase of this material and return to the copper slag sold by Kleen Blast which comes from Grand Forks, B.C. This material has repeatedly proven to have acceptably low levels of the toxic heavy metals normally present in copper slags from other sources.

J. T. Lane

JTL:drf

*John - no change in policy. Our slag/sand
is from Kleen Blast via Grand Forks, B.C.*

*Bill
6/26/84*

NORTHWEST ENVIRONMENTAL SERVICES

Maritime Building

911 Western Avenue, Seattle, WA 98104

Business • (206) 622-8353

February 28, 1984

Ref: 84-1; Grits/3 combined as 1; EDAX; 1/30/84

Janet Wildeboor

Lockheed Shipbuilding & Construction Company

2929 16th Avenue S. W.

Department 5000, Building 201, Yard 2

Seattle, Washington 98134

TRIAL
(New Grit)
RA Barnes

Ms. Wildeboor :

The average relative weight percent of the elements in the combined blasting grit samples (GLNX, S84559 and S 84565) are:

Arsenic	0.4% (0.2 - 0.6)
Aluminum	1.2%
Silicon	6.8%
Sulfur	0.2%
Potassium	1.9%
Calcium	9.3%
Titanium	.2%
Manganese	.5%
Iron	47.8%
Copper	1.6%
Zinc	4.8%

There is possibly some magnesium present in the 0.5% - 1.0% range.

Sincerely,

NORTHWEST ENVIRONMENTAL SERVICES

Dennis Moore

Dennis Moore, Technician

Approved By RM Orheim

Robert M. Orheim

Director of Laboratories

DM/ges

**KLEEN BLAST**

KLEEN BLAST

A DIVISION OF LEISURE INVESTMENT CO.



Tacoma, Washington
January 18, 1984

Paul Koshiyama
Lockheed Shipbuilding
2929-16th Ave. Sw.
Seattle, Wa. 98134

Re: RFQ 6A-321 PO S6A321B

Paul:

After discussing the referenced RFQ & PO concerning your requirements for blasting abrasive, I find there are certain differences in requirement between the suppliers. As stated in your RFQ, certain requirements had to be met that enabled Lockheed to bring in a material that was going to bring them the highest production at the best possible price, and be the safest product for the workers. KLEEN BLAST has supplied Lockheed for many years and have gone through many hours of testing and conferences with Lockheed personnel to provide them a material which would be cost effective and dust free. The new RFQ was based upon these much needed requirements of Lockheed. It is not difficult for a company to process the material to meet a requested screen size, and we feel that we can provide this material well within the specs. However, what concerns me is the chemical analysis section in item 10. The chemical analysis was based on the KLEEN BLAST material and appears to have been taken directly from our product data sheet. I therefore find it extremely difficult to understand how a material other than KLEEN BLAST would be able to meet your specifications. If another product is lower in one area, they would most certainly be higher in another.

The U.S. Navy Shipyards in the Pacific have most recently changed their specifications on slag abrasive to reflect a concern for toxic substances which are an inherent property of many slag abrasives. These substances of concern are arsenic, cadmium, lead and beryllium. KLEEN BLAST fortunately has been blessed by not having levels of the substances high enough to be considered toxic. However, other slag abrasives on the market have been shown to contain levels unacceptable in Naval installations. KLEEN BLAST at present is the supplier of slag abrasives to Puget Sound Naval Shipyard because of our ability to meet their specs.

ALL PURPOSE ABRASIVES

Headquarters: 30100 Mission Blvd., Hayward, CA 94544 • (415) 471-2100 • (800) 227-1134 • Telex 336356

Plant: 30028 Industrial Parkway S. W., Hayward, CA • (415) 489-9444 • Joe Oliveira, Manager

Plant: 3650 N. W. Yeon Ave., Portland, OR 97210 • (503) 228-3965 • Telex 151621 • Larry Bonander, Manager

Plant: 1448 St. Paul Ave., Tacoma, WA 98421 • (206) 383-2168 • Mark Gadsby, Dir. of Marketing

*(Robert A. Barnes specifically
Ludak)*

Paul Koshiyama
January 18, 1984
Page 2

The method of testing recommended by the Industrial Hygiene Department at PSNS is called X-Ray Florescence, whereby the material is bombarded for a reading. This test is non-destructive and will show a higher chemical makeup than a destructive test whereby some of the elements of concern are destroyed in acid solutions. This therefore would show a somewhat lower level of harmful elements and would in some instances bring the material into spec.

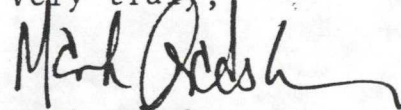
KLEEN BLAST will have its slag products tested by X-Ray Florescence or any other method such as Atomic Absorbtion which is sensitive to 1 part per billion, against our competition and show without doubt our product is the most hygienically safe.

To emphasize a point I have made, I will provide the following concerning productivity levels: I will provide a load of material at my competition's price to Lockheed. I will provide the material in a KLEEN BLAST pneumatic truck, which holds only KLEEN BLAST. This material would be used in a production mode and should give an indication of the properties of KLEEN BLAST at no additional cost or inconvenience to Lockheed.

If you would be interested in a comparison, and allowing KLEEN BLAST to back up its claims, we are more than willing to proceed.

Looking forward to your response, I remain,

Very truly,



Mark Gadsby,
Director of Marketing

TUF KUT

Cuts through the toughest finishes!

The success of TUF KUT as one of the most effective abrasive materials on the market is attributed to its inherent quality and unique processing.

TUF KUT, which contains no free silica, is composed of angular and sub-angular

shaped particles allowing for faster, cleaner and safer production. The fact that TUF KUT leaves excellent etch and anchor patterns along with its reuseability as an abrasive add to the growing demand for TUF KUT throughout the industry.

Screen Analysis

% RETAINED ON U.S. SCREEN		
Screen #	#36	#16
12	0-2	0-10
14	2-10	
16	10-20	25-50
20	30-50	25-40
30	10-30	5-15
40	5-20	0-10
50	2-10	0-2
PAN	Trace	Trace

Chemical Analysis

Silicon Dioxide (SiO_2) 34.9%

Iron Oxide (Fe_2O_3) 32.00%

Alum. Oxide (Al_2O_3) 3.83%

Calcium Oxide (CaO) 21.80%

Magnesium Oxide (MgO) 1.43%

Copper (Cu) .40%

Arsenic .003%

No Free Silica

Hardness on Mohs scale exceeds Mil-S-22262 (SHIPS)

Chemical Analysis Performed By:

Am Test Inc., Seattle; Laucks Testing Labs, Seattle; Twining Laboratories, Los Angeles and E.M.S. Laboratories, Hawthorne, CA.

R.A. Barnes, Inc.

Seattle—(206) 762-0920 • Portland—(503) 283-4191 • Oakland—(415) 839-9418

INTRODUCING

KLEEN BLAST

DUSTLESS

A "NEW" ALL-PURPOSE ABRASIVE

CUTS THE TOUGHEST FINISHES

PROVEN BY ACTUAL WORKING TESTS

- **KLEENER**
- **SAFER**
- **FASTER**
- **RE-USABLE**

More and more companies today are becoming aware that to clean surfaces by sandblasting means running a dangerous health hazard because of the dust conditions involved. KLEEN BLAST solves this problem with a clean, sharp, hard material, containing no free silica and that is dustless. Result: Faster working, lower production costs, greater safety.

KLEEN BLAST ABRASIVE CHEMICAL ANALYSIS*

Tests performed and results
Sample:

KLEEN BLAST Grit

Silicon Dioxide (SiO_2)	. . . . .	48.24%
Iron Oxide (Fe_2O_3)	. . . . .	.97%
Iron Oxide (FeO)	. . . . .	18.10%
Aluminum Oxide (Al_2O_3)	. . . . .	9.05%
Calcium Oxide (CaO)	. . . . .	18.48%
Magnesium Oxide (MgO)	. . . . .	2.90%
Copper (Cu)	. . . . .	.10%
Manganese (Mn)	. . . . .	.22%
FREE SILICA	. . . . .	NONE
Arsenic	. . . . .	NONE

*Chemical analysis performed by Pittsburg
Testing Laboratories, Inc., Spokane, Wash.

LESS

HEALTH HAZARD

TO WORKERS

MEETS MIL. SPEC.

22262

The logo for KLEEN BLAST, featuring the words "KLEEN BLAST" in a bold, sans-serif font, with "KLEEN" on the top line and "BLAST" on the bottom line. The text is white and set against a dark, cloud-like background.

KLEEN BLAST DIVISION

LEISURE INVESTMENT CO.

30100 MISSION BLVD.

HAYWARD, CALIFORNIA 94544

TELEPHONE (415) 471-2100



Speed Your Production with. . .

These KLEEN BLAST Advantages

- LESS HEALTH HAZARD
- NO FREE SILICA
- FASTER CUTTING
- LESS LABOR

PROVEN IN ACTUAL TESTS WITH COMPETITIVE GRITS

A PRODUCT OF CANADA

DUST FREE

GOOD ETCH AND ANCHOR PATTERN

RE-USABLE —

PROPER RECLAMATION AND
REMOVAL OF FOREIGN MATERIAL
RESULTS IN MANY DUSTLESS RUNS

CERTIFIED BY —

STATE OF CALIFORNIA AIR
RESOURCES BOARD FOR DRY
UNCONFINED ABRASIVE BLASTING

LESS HEALTH HAZARD TO WORKERS!!

KLEEN BLAST

RETAINED ON U. S. SCREENS	8-12	16-30	35
8	10-20%	0-1%	0-1%
10	25-35%	0-1%	0-1%
12	35-45%	5-10%	0-1%
16	10-20%	15-25%	0-5%
20	0-5%	20-30%	10-15%
30	0-5%	20-25%	30-40%
35	0-1%	5-10%	10-20%
40	0-1%	5-10%	10-15%
50	0-1%	5-10%	10-15%
ANCHOR PATTERN at 90 PSI (Approx)	.005	.003	.002

KLEEN BLAST DIVISION
Leisure Investment Co.
30100 Mission Boulevard
Hayward, CA 94544
(415) 471-2100
(415) 489-9444

KLEEN BLAST DIVISION
Leisure Investment Co.
3650 N.W. Yeon Avenue
Portland, Oregon 97210
(503) 228-3965
(800) 227-1134

KLEEN BLAST DIVISION
Leisure Investment Co.
1448 St. Paul Avenue
Tacoma, WN 98421
(206) 383-2168
(800) 227-1134

NORTHWEST

of Seattle,

LABORATORIES

Incorporated

Technical Services for: Industry, Commerce, Legal Profession & Insurance Industry

1530 FIRST AVENUE SOUTH

• SEATTLE, WASHINGTON 98134 •

Telephone: (206) 622-0680

Report to: Lockheed Shipbuilding

Date: May 17, 1982

Report on: Sandblast Grit/
Arsenic & Free Silica
P.O. No. FKM4D469A

Lab. No. E 25254

SUBMITTED:

Five (5) samples of Sandblast Grit

IDENTIFICATION:

1. (R.A. Barnes, Inc.) Tuf-Kut #36
2. (C.I.S. Northwest) I.M.P. #35
3. (Lonestar) #2 Copper Slag Dried 5-10-82
4. Apache 16-50 El Paso
5. Apache Blast 16-50 Copperhill, TN

RESULTS:

	<u>Arsenic, %</u>	<u>Free Silica (Respirable Trydimite), %</u>
Sample 1	Less than 0.05	Undetectable, less than 0.01
Sample 2	8	" "
Sample 3	7 (also 1% lead)	" "
Sample 4	1.5	" "
Sample 5	0.3	" "

NORTHWEST LABORATORIES


SAM LEBARRON

1m

NORTHWEST
of Seattle,

LABORATORIES
Incorporated

Technical Services for: Industry, Commerce, Legal Profession & Insurance Industry

1530 FIRST AVENUE SOUTH

• SEATTLE, WASHINGTON 98134 •

Telephone: (206) 622-0680

Report to: Lockheed

Date: May 14, 1982

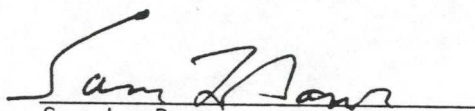
Report on: Sandblast Grit/Arsenic & Free Silica **Lab. No.** E 25205

IDENTIFICATION: SP 400407

RESULTS:

Arsenic - 0.9%

Free Silica - (Respirable Trydimite) - 0.013%


Sam Le Barron

SOL:kgk

INTRODUCING

May 1979

KLEEN BLAST

DUSTLESS

A "NEW" ALL-PURPOSE ABRASIVE

CUTS THE TOUGHEST FINISHES

PROVEN BY ACTUAL WORKING TESTS

- KLEENER
- SAFER
- FASTER
- RE-USABLE

More and more companies today are becoming aware that to clean surfaces by sandblasting means running a dangerous health hazard because of the dust conditions involved. KLEEN BLAST solves this problem with a clean, sharp, hard material, containing no free silica and that is dustless. Result: Faster working, lower production costs, greater safety.

KLEEN BLAST ABRASIVE CHEMICAL ANALYSIS*

Tests performed and results

KLEEN BLAST Grit

Sample:

Silicon Dioxide (SiO_2)	48.24%
Iron Oxide (Fe_2O_3)	.97%
Iron Oxide (FeO)	18.10%
Aluminum Oxide (Al_2O_3)	9.05%
Calcium Oxide (CaO)	18.48%
Magnesium Oxide (MgO)	2.90%
Copper (Cu)	.10%
Manganese (Mn)	.22%
FREE SILICA	NONE
Arsenic	NONE

*Chemical analysis performed by Pittsburg
Testing Laboratories, Inc., Spokane, Wash.

LESS

HEALTH HAZARD

TO WORKERS

MEETS MIL. SPEC.

22262

KLEEN BLAST

KLEEN BLAST DIVISION
OF LEISURE INVESTMENT
30700 MILLER BLVD. HAYWARD, CALIF. 94541
(415) 474-2400

INTERDEPARTMENTAL COMMUNICATION

TO R. V. Estes

DEPT./
ORGN. 4330

BLDG./
ZONE 312

PLANT/
FAC. 3

DATE 5/17/82

FROM J. T. Lane

DEPT./
ORGN. 1100

BLDG./
ZONE 102

PLANT/
FAC. 1

EXT. 5575

SUBJECT: SPECIFICATIONS FOR SANDBLASTING GRIT.

To insured compliance with federal environmental pollution control laws and safety and health standards, abrasive materials used for the abrasive blasting of metal surfaces should have the following chemical compositions for toxic metals.

<u>Metal</u>	<u>Analysis to be less than % listed</u>
-Arsenic	0.05
Beryllium	0.005
-Cadmium	0.01
-Chromium	0.1
Copper	0.5
-Lead	0.05
-Nickel	0.01
Molybdenum	0.01
Manganese	0.5
Mercury	0.01
Tin	0.01
Free Silica	0.5

Suppliers of sandblast grit should submit a chemical analysis of the material to be supplied, and certify that the material meets or exceeds the listed specifications.

J. T. Lane

*Reissued
9/14/84*

JTL/klw

NORTHWEST ENVIRONMENTAL SERVICES

Maritime Building
911 Western Avenue, Seattle, WA 98104
Business • (206) 622-8353

June 30, 1984

Ref: 93-17, Slag/1: Metals: 6/18/84; P. O. #FPM-4K902B

Janet Wildeboor
Lockheed
2929 16th Avenue S. W.
Dept. 5000, Bldg. 201, Yard 2
Seattle, Washington 98134

Ms. Wildeboor:

The Kleen Blast sand blasting material has been analyzed.

<u>ANALYTE</u>	<u>PERCENT, By WEIGHT</u>
Arsenic	< 0.005
Beryllium	< 0.0002
Chromium	0.052
Copper	0.19
Lead	< 0.002
Nickel	0.023

Sincerely,

NORTHWEST ENVIRONMENTAL SERVICES

Dennis Moore, Technician

Approved By B. M. Orheim

Robert M. Orheim

Director of Laboratories

DM/ges



CHICAGO SPECTRO SERVICE LABORATORY, INC.

Spectrographic and Chemical Analysts
Metallurgists

4848 S. KEDZIE AVE. • CHICAGO, ILL. 60632

ANALYSIS REPORT FOR:

AREA CODE 312 - 523-7088

- Kleen Blast Div.
- Leisure Investment Co.
- 30100 Mission Blvd.
- Hayward, California 94544
- Attn: E. Craig Mitchell

PURCHASE ORDER NO.

DATE September 1, 1976

Report Number: 1534

Sample Number: 16/30

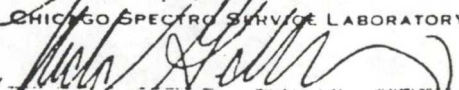
Arsenic	ND<0.01%
Beryllium	T<0.001
Lead	T<0.001
Nickel	T<0.001
Mercury	ND<0.01
Cadmium	ND<0.001
Sulfur	0.178
Flouride	0.020
Selenium	<0.01
Chromium	0.01

TRACE ELEMENTS APPROXIMATE* (Amounts Indicated are approximate)

Manganese	>0.1
Copper	0.1
Boron	0.005
Molybdenum	0.001
Vanadium	0.001
Tin	T<0.001
Silver	0.00005
Cobalt	0.003
Barium	0.03
Strontium	0.05

* TRACE ELEMENTS ARE DEFINED AS .1% AND LOWER

T - Trace
ND - Not Detected

CHICAGO SPECTRO SERVICE LABORATORY, INC.
BY 

NORTHWEST ENVIRONMENTAL SERVICES

Maritime Building
911 Western Avenue, Seattle, WA 98104
Business • (206) 622-8353

February 28, 1983

Ref: 62-18; blasting grit

John Lane
Lockheed
2929 16th Ave. SW
Dept. 5000, Bldg. 201, Yard 2
Seattle, Wa. 98134

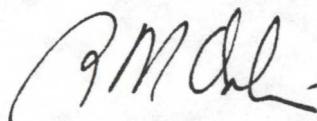
*Composite sample
from ~~sample~~ samples
June 1 - December 15
1983*

John:

This blasting grit composite (7 samples) contained no lead
or arsenic.

Sincerely,

NORTHWEST ENVIRONMENTAL SERVICES



Robert M. Orheim
Director of Laboratories

RMO/sjd



am test inc.

FEB 10 1984

4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107-3697 • 206/783-4700

ANALYSIS REPORT

CLIENT: Robert A. Barnes, Inc.

DATE RECEIVED: 1/17/84

REPORT TO: Mr. Matt Barnes
151 South Michigan
Seattle, WA 98108

DATE REPORTED: 2/8/84

EP TOXICITY ANALYSIS

Laboratory Sample No.	73152	
Client Identification	Anaconda Composite	Maximum Allowable Concentrations
Arsenic	0.037	5.0
Barium	<1.0	100.0
Cadmium	<0.05	1.0
Chromium	<0.05	5.0
Lead	<0.25	5.0
Mercury	<0.001	0.2
Selenium	<0.005	1.0
Silver	<0.05	5.0
Zinc	1.0	---
Copper	4.0	---

* All values in mg/l (ppm).

REPORTED BY

Kathy Kreps
Kathy Kreps



STATE OF WASHINGTON

DEPARTMENT OF LABOR AND INDUSTRIES

DIVISION OF INDUSTRIAL SAFETY & HEALTH

300 West Harrison Street

Seattle, Washington 98119

July 5, 1985

Lockheed Shipbuilding Company
2929 16th Ave. S.W.
Seattle, WA 98134

Re: S&H # 328062

Attention: Ms. Janet Wildeboor
Industrial Hygiene/Occupational Nursing

Dear Ms. Wildeboor:

The analytic results of the Kleenblast[®] Cu grit, sampled in the Shipyard #1 Abrasive Blasting Area, arrived today. The method used was atomic absorption. The analysis indicated the presence of 0.03% As and 0.003% Pb. No detectable amount of Hg was found present in the sample, with detection limits at 0.001%.

You appear to be receiving a product which is extremely low in heavy metal constituents, thus significantly decreasing the possibility of worker exposure to heavy metals.

Please call me at 281-5437 if you have any questions about these results.

Sincerely,

A handwritten signature in dark ink, appearing to read "Eric Tabb".

Eric Tabb
Industrial Hygienist

ET:mjw

cc: John Lane, Safety Director
Wilber Wilson, Plumbers & Pipefitters Local #32
Inspection Representative for Shipyard Trades

NORTHWEST ENVIRONMENTAL SERVICES

Maritime Building
911 Western Avenue, Seattle, WA 98104
Business • (206) 622-8353

Ref: 111-3; Slag/2: Metals; 3/1/85; P.O.# FRM-4Y847B

April 2, 1985

Janet Wildeboor
Lockheed Shipbuilding & Construction Co.
2929 16th Avenue S.W.
Seattle, Washington 98134

Ms. Wildeboor:

The blasting grit samples you submitted to this laboratory have been analyzed for metals as per request. The results are as follows:

I. EP TOXICITY TEST

Extractable Metals (milligrams/liter)	Samples Kleenblast composite	Waste Grit
Arsenic (As)	<0.01	<0.01
Chromium (Cr)	<0.01	≤0.03
Copper (Cu)	0.57	0.69
Nickel (Ni)	0.05	0.15
Lead (Pb)	<0.01	0.07
Zinc (Zn)	0.43	56

II. X-RAY FLUORESCENCE

Total Metals (percent by weight)	Samples Kleenblast composite	Waste Grit
Arsenic (As)	<0.04	<0.04
Chromium (Cr)	<0.04	<0.04
Copper (Cu)	0.6	0.7
Nickel (Ni)	<0.04	<0.04
Lead (Pb)	<0.08	<0.08
Zinc (Zn)	<0.07	0.6

Sincerely,
NORTHWEST ENVIRONMENTAL SERVICES

Dennis C. Moore
Dennis C. Moore
Chemical Technologist
Approved By *RM Orheim*
Robert M. Orheim
Director of Laboratories

Laucks

Testing Laboratories, Inc.

940 South Harney St. Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT: Lockheed Marine
2929 16th Avenue SW
Seattle, WA 98134
ATTN: John Lane

LABORATORY NO. 89234

DATE: May 10, 1985

PO# FHU9S44CB

REPORT ON: SAND PLAST WASTE

SAMPLE IDENTIFICATION Submitted 4-4-85 and marked "Yard 1 - Slab 3"

TESTS PERFORMED AND RESULTS:

parts per million (mg/kg), dry basis

Total Arsenic	16.
Total Barium	750.
Total Cadmium	0.1
Total Chromium	59.
Total Lead	12.
Total Mercury	<0.1
Total Selenium	<0.5
Total Silver	1.8
Total Nickel	60.
Total Copper	2,400.
Total Zinc	1,000.

Sample was also analyzed in accordance with 40 CFR, Part 261.24 for EP Toxicity, with results as shown below:

concentration, mg/L

	<u>Sample</u>	<u>UCL</u>
Arsenic	<0.1	5.0
Barium	0.4	100.
Cadmium	<0.01	1.0
Chromium	<0.1	5.0
Lead	<0.1	5.0
Mercury	<0.005	0.2
Selenium	<0.2	1.0
Silver	<0.1	5.0



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PAGE NO. 2

Lockheed Marine

LABORATORY NO. 89234

<u>concentration, mc/L</u>		
<u>Sample</u>	<u>MCL</u>	
Nickel	<0.1	---
Copper	0.4	---
Zinc	19.	---

Key

MCL = Maximum Contamination Level allowed per regulation.

< = Less than

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens
J. M. Owens

JMO:rtv



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940 South Harney St., Seattle, Washington 98108 (206)767-5060

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Certificate

CLIENT: Lockheed Marine
2929 16th Avenue SW
Seattle, WA 98134
ATTN: John Lane

LABORATORY NO. 89234

DATE: May 10, 1985

PO# FHM9S440B

REPORT ON: SAND BLAST WASTE

SAMPLE
IDENTIFICATION

Submitted 4-4-85 and marked "Yard 1 - Slab 3"

TESTS PERFORMED
AND RESULTS:

parts per million (mg/kg), dry basis

Total Arsenic	16.
Total Barium	750.
Total Cadmium	0.1
Total Chromium	59.
Total Lead	12.
Total Mercury	<0.1
Total Selenium	<0.5
Total Silver	1.8
Total Nickel	60.
Total Copper	2,400.
Total Zinc	1,000.

Sample was also analyzed in accordance with 40 CFR, Part 261.24 for EP Toxicity, with results as shown below:

concentration, mg/L

	<u>Sample</u>	<u>MCL</u>
Arsenic	<0.1	5.0
Barium	0.4	100.
Cadmium	<0.01	1.0
Chromium	<0.1	5.0
Lead	<0.1	5.0
Mercury	<0.005	0.2
Selenium	<0.2	1.0
Silver	<0.1	5.0



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Lockheed Marine

LABORATORY NO. 89234

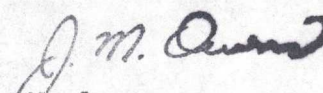
	<u>concentration, mg/L</u>	
	<u>Sample</u>	<u>MCL</u>
Nickel	<0.1	---
Copper	0.4	---
Zinc	19.	---

Key

MCL = Maximum Contamination Level allowed per regulation.
< = Less than

Respectfully submitted,

Laucks Testing Laboratories, Inc.


J. M. Owens

JNO:rtv



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RECEIVED
JUN 10 1985
HUMAN RESOURCES

Handwritten signature

Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT: Lockheed
2929 16th Avenue SW
Seattle, WA 98134
ATTN: Greg Metzcus

LABORATORY NO. 93048
DATE: Oct. 23, 1985
P.O.# FDM 6 P399B

REPORT ON: SOIL

SAMPLE Submitted 9/18/85 and identified as shown below:
IDENTIFICATION:

44I Slabs Spent Grit #1 Metzcus 9/19/85 10 a.m.

TESTS PERFORMED
AND RESULTS:

Samples were analyzed for E.P. Toxicity using Method 1310, Test Methods for Evaluating Solid Wastes, U.S.E.P.A., July, 1982. Metals analysis were performed using the 7000 series of methods.

parts per million (mg/L)

1

Copper
Zinc

0.9
240.

The 96 hour static fish bioassay was performed in accordance with Washington State Department of Ecology methods, with results as shown below:

96 HOUR STATIC FISH BIOASSAY

Description of Test Set Up

The test was performed in triplicate at each concentration in 10 gallon glass aquaria (8" x 10" x 14") containing 30 liters of water. The water used in the test was tap water with a hardness of about 110 mg/L. Light was provided with fluorescent lamps for 18 hours per day. All test and control aquaria contained 10 organisms. All tanks were aerated during the first 24 hours of the test period; no further aeration was made during the 96 hour test period. The test was started on 10/07/85. The waste was added to the tanks directly.



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940 South Harney St., Seattle, Washington 98108 (206)767-5060



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PAGE NO. 2

Lockheed

LABORATORY NO. 93048

Information About Test Organisms

Species: Pimephales promelas (fathead minnow)
Mean Weight: 0.73 grams
Ratio of flesh to water: 0.24 grams/L
Lengths (in mm): mean 3.7 cm
longest 4.2 cm
shortest 3.1 cm
Ratio (long/short): 1.4
Diseases observed: None
Disease treatment: None required
Source of test organisms: Kurtz Fish Hatchery
History: Acclimated at least 2 weeks prior to test
Food used: Wardley's dry flake food for large cichlids

Test Results

Observations of effects or symptoms: No visible stress observed.

Mortalities observed in 30 test organisms:

	<u>Mortalities</u>	<u>%</u>
1000 parts per million	0	0.
100 parts per million	1	3.3
control	0	0.

Water chemistry results: mean +/- standard deviation

	<u>1000 ppm</u>	<u>100 ppm</u>	<u>control</u>
Dissolved Oxygen, mg/L	7.+-.92	7.4+-.67	7.1+-.79
pH	7.1+-.34	7.2+-.61	7.+-.59
Temperature, C	22.+-.0.	22.+-.0.	22.+-.0.
Hardness, mg/L	140.+-.4.1	140.+-.6.3	140.+-.4.1
Alkalinity, mg/L	26.+-.2.	30.+-.5.4	26.+-.1.
Conductivity, micromhos/cm	320.+-.5.	320.+-.10.	310.+-.8.



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PAGE NO. 3

Lockheed

LABORATORY NO. 93048

Test organisms were acclimated at 22 C.

Test Methods Used for Water Chemistry

Dissolved Oxygen	SM*, part 421B
pH	SM*, part 423
Total Hardness	SM*, part 314B
Total Alkalinity	SM*, part 403
Specific Conductance	SM*, part 205

*SM = Standard Methods, 15th edition

Conclusions

Based on an evaluation of test mortalities (corrected for control mortality), this waste would be classified as undesignated waste.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J.M. Owens

JMO:laj



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Laucks

Testing Laboratories, Inc.

940 South Harney Street. Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology and Technical Services



Certificate

CLIENT Lockheed Marine
2929-16th Ave. SW
Seattle, WA 98134
ATTN: Bill Petryk

LABORATORY NO. 83605

DATE February 25, 1984

PO #FKM6U228B

REPORT ON COPPER SLAG SANDBLAST

SAMPLE
IDENTIFICATION

Submitted 2-14-84 and identified as shown below:

Copper Slag Sandblast Grit

TESTS PERFORMED
AND RESULTS:

Sample was analyzed in accordance with 40 CFR 261.24 for EP Toxicity with results as follow:

	<u>concentration, mg/L</u>	<u>MCL*</u>
Arsenic	L/0.2	5.0
Barium	L/1.	100.
Cadmium	L/0.02	1.0
Chromium	L/0.1	5.0
Lead	L/0.2	5.0
Mercury	L/0.005	0.2
Selenium	L/0.2	1.0
Silver	L/0.1	5.0

*MCL = Maximum Concentration Allowed by Regulation

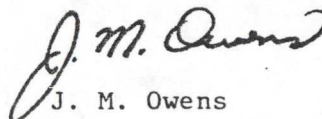
Key

L/ indicates "less than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

cc: Accounts Payable


J. M. Owens

JMO:vb



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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT Lockheed Shipbuilding
2929 16th Avenue S. W.
Seattle, WA 98134
Attn: John Dislers

LABORATORY NO. 76619

DATE May 13, 1982

P.O. #FKM4X357B

REPORT ON GRIT

SAMPLE IDENTIFICATION Submitted on 5-10-82 and marked "Sandblasting Grit"

TESTS PERFORMED
AND RESULTS:

This material was analyzed in accordance with 40 CFR 261.24 for EP Toxicity with results as follows:

	<u>concentration, mg/L</u>	<u>Maximum concentration, mg/L</u>
Arsenic	0.3	5.0
Barium	3	100
Cadmium	<.02	1.0
Chromium	<.1	5.0
Lead	1.3	5.0
Mercury	<.005	0.2
Selenium	0.2	1.0
Silver	<.1	5.0

Key

< denotes "less than"

Respectfully submitted,

LAUCKS TESTING LABORATORIES, INC.

J. M. Owens
J. M. Owens



JMO:ks

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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

CLIENT Lockheed Shipbuilding Corp.
2929-16th Avenue S. W.
Seattle, WA 98134
ATTN: Ed Cifra

LABORATORY NO. 79918

DATE April 5, 1983

P.O. #FKM6U228B

REPORT ON

MATERIAL

SAMPLE
IDENTIFICATION

Submitted 3/23/83 and marked as shown below:

TESTS PERFORMED
AND RESULTS:

- 1) Grit Blast YR-1 3/22/83
- 2) Pangborn, Under Pier Waste Sample 3/22/83
Yd I, Near Bldg 116

1

Flast Point, Pensky Martens
Closed Cup, °F

66.

Sample #2 was analyzed in accordance with 173-303 WAC, State of Washington, Department of Ecology, with results as follow:

	<u>concentration, mg/L</u>	
	<u>2</u>	<u>MCL*</u>
Arsenic	<0.2	5.0
Barium	<0.5	100.
Cadmium	0.02	1.0
Chromium	<0.1	5.0
Lead	<0.1	5.0
Mercury	<0.005	0.2
Selenium	0.3	1.0
Silver	<0.1	5.0



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Laucks

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940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

PAGE NO. 2

Lockheed Shipbuilding Corp.

LABORATORY NO. 79918

Key

< indicates "less than"

*MCL = Maximum Contamination Level allowed

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:bg



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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

GERALD T. SKAR
MANAGER
INSTRUMENTAL ANALYSIS DIVISION



PLEASE ADDRESS ALL CORRESPONDENCE TO:
490 ORCHARD ST., GOLDEN, CO. 80401
OFFICE TEL. (303) 278-9521

Mr. Gatsby
Kleenblast Abrasives
1448 St. Paul
Tacoma, WA 98421

Date: November 2, 1984
IAD #97-R547-751-02
Samples Received: 10/17/84

Material: Abrasives

Procedure: California citrate toxic extraction, per EPA-600/8-80-038

Results:

Parameter	Kleenblast #16-30	Tru-Grit #35
Antimony	0.30	0.11
Arsenic	1.09	0.09
Barium	37	146
Cadmium	<0.2	<0.2
Chromium, total	3.66	9.50
Chromium, trivalent	3.45	9.12
Chromium, hexavalent	0.21	0.38
Cobalt	3.8	22.4
Copper	2.38	0.60
Fluorine	15	12
Lead	1.5	0.5
Mercury	<0.09	<0.09
Molybdenum	0.52	2.59
Selenium	<0.02	<0.02
Silver	<0.04	0.26
Thallium	2	3
Vanadium	1.1	7.5
Zinc	25.0	365

If you have any questions concerning these results, please call.

Martha L. Turner
Martha L. Turner
Supervisor
Environmental Section



Charter Member

NORTHWEST ENVIRONMENTAL SERVICES

Maritime Building
911 Western Avenue, Seattle, WA 98104
Business • (206) 622-8353

October 31, 1984

Ref: 98-9; Blasting Grit/2: Metals; 8/20/84

Mark Gadsby
KLEENBLAST
1448 St. Paul Avenue
Tacoma, Washington 98421

Mr. Gadsby:

The samples you delivered to this laboratory have been analyzed to see if the materials are within California States specific requirements.

Calc Citrate Extraction Test

	mg/l		
	KLEENBLAST #16-30	Tru-Grit #16-30	Spec (max. allowed)
Antimony	<3	<3	100
Arsenic	<0.01	<0.01	5.0
Barium	<3	<3	100
Beryllium	<0.001	<0.001	0.75
Cadium	<0.01	<0.01	1.0
Chromium (total)	<0.01	<0.01	5
Cobalt	<0.01	<0.01	80
Copper	1.2	1.6	25
Fluoride	<0.2	<0.2	180
Lead	<0.01	<0.01	5.0
Mercury	<0.002	<0.002	0.2
Molybdenum	<0.4	<0.4	350
Nickel	<0.01	<0.01	20
Selenium	<0.01	<0.01	10
Silver	<0.01	<0.01	5
Thallium	<0.01	<0.01	7.0
Vanadium	<0.5	<0.5	24
Zinc	0.12	0.15	250

Sincerely,
NORTHWEST ENVIRONMENTAL SERVICES

Dennis Moore, Technician
Approved By AMD
Robert M. Orheim
Director Of Laboratories

R.A. Barnes, Inc.

151 South Michigan Street
Seattle, Washington 98108
(206) 762-0920

Recently, a potential environmental problem surfaced concerning the use of copper slag as an abrasive media.

As a supplier of these abrasives, Robert A. Barnes, Inc., is naturally concerned about potential problems our customers may face.

In the past, the pendulum of public concern for environmental conditions has favored industry via lax control of wastes. Today, the pendulum seems to have shifted in the opposite direction of excessively stringent standards which have restrained the growth of industry. While we recognize that controls are necessary, we must be careful not to establish unreasonable limits that are not in effect elsewhere for good reason and act only to increase costs.

In this meeting today, I would like to present information which supports the safe use of our abrasive product in your shipyard.

We market an abrasive under the trade name of Tuf Kut. It is a water-quenched copper slag from Anaconda, Montana. At this point, allow me to give you a very brief background on the types of abrasives other shipyards use, around the country. Generally, the East Coast shipyards use coal slags. The Gulf Coast shipyards use coal slags and copper slags. The West Coast yards use primarily copper slags. The use is determined by economic factors and local availability.

Coal slags and copper slags all contain trace elements of heavy metals and other elements which remain in the slags after processing of the coal or raw ores. The levels of these trace elements vary depending on geological makeup of the ores and type of processing.

The question of whether the trace elements pose a health hazard in abrasive blastings was first raised in 1974 by NIOSH. Their finding concluded a potential health hazard may exist but more information was needed. Later, NIOSH injected coal slag dust and copper slag dust into the lungs of rats. It was determined that coal slags may cause fibrosis, whereas the copper slags, without exception, showed no signs of fibrogenic activity. It was also stated that the injected dusts do cause multiple granulomas. The copper slags tested had higher levels of heavy metals than Tuf Kut.

In 1978 the Mark Steel Corporation of Salt Lake was visited by NIOSH. Air samples were taken during abrasive blasting with copper slag as the abrasive. It was determined that arsenic and lead levels exceeded OSHA limits outside of the workers' respirators during blasting operations. NIOSH recommended an alternative be sought. After several years of debate, OSHA has not enforced the NIOSH recommendation. One of the reasons was because the workers wore air-fed, full-face masks which reduced the potential hazard. Mark Steel is still using copper slag as an abrasive.

Most recently, PSNS in Bremerton ran tests. Air samples tested in two copper slags both showed excessive levels of arsenic when blasting was performed in enclosed tanks. Those two slags were the Asarco slag and Kleenblast slag from Grand Forks, British Columbia.

It is apparent that under severe enclosed tank blasting, few slags can meet OSHA airborne concentration levels over an 8-hour period without proper ventilation. This is due to the tremendous amounts of dust generated. In fact, naturally occurring minerals such as garnet are not likely to meet OSHA levels for the same reason. However, abrasive blasting in enclosures is a necessity, and proper ventilation and respiratory practice is necessary with all abrasives.

Therefore, I would question movements trying to specify exceedingly low percentages by weight as a method of eliminating competition. It is quite clear that no slag can meet OSHA requirements in all situations at all times unless the user requires ventilation and approved respiratory protection.

At this point, I would like to address a similar issue. The National Academy of Sciences in their recent journal on arsenic clearly identifies key factors to consider in determining the potential risks associated with arsenic. They are: concentration levels of arsenic, the form of the arsenic, and the solubility of arsenic.

Extensive testing on Tuf Kut has indicated the slag is of a vitreous nature with an amorphous structure. This implies a relatively inert material of extremely low solubility. In fact, highly concentrated mineral acids are

required to dissolve the slag to determine chemical analysis.

Five-year testing on the Anaconda slags has failed to show any ability of significant leaching when exposed to the natural weathering cycle. Tuf Kut has passed the E. P. Toxicity test as well. This indicates that Tuf Kut is not likely to leach heavy metals to the surrounding environment. It would seem apparent that greater hazards to the environment exist from removed paints and primers than from abrasives like Tuf Kut with relatively low heavy metals. However, the spent abrasive contaminated with paints and primers should be removed as much as possible from dry docks and surrounding areas.

As a supplier of abrasives, Robert A. Barnes, Inc. feels the responsibility to educate our customers so that they may make reasonable and informed decisions. Based on what you have heard today, we hope you will establish reasonable guidelines concerning safe use of abrasives.

LOCKHEED SHIPBUILDING COMPANY
INTERDEPARTMENTAL COMMUNICATION

TO D. F. Tellman DEPT./ ORGN. 3000 BLDG./ ZONE 201 PLANT/ FAC. 2 DATE 11/15/85

FROM G. J. Metzcus DEPT./ ORGN. 1140 BLDG./ ZONE 208 PLANT/ FAC. 2 EXT. 4745

SUBJECT LAUNCH CONTROLS FOR LSD-43

The Washington Department of Ecology has issued basic guidelines and approval for launch of the LSD-43 using a copper ladened ways grease (Slipcoat 10).

Basic requirements will be to record the amount applied, record the amount retrieved after launch, thereby establishing an estimate of the amount left in the waterway. The Department has also required LSC to test the grease for E. P. toxicity before and after use to establish possible leaching of the copper into the water.

Enclosed is Brian Eccle's launch report and the Department's letter on methods to be followed.

G. J. Metzcus
G. J. Metzcus

Environmental Programs Coordinator

CONCURRENCE:

J. T. Lane

J. T. Lane
Manager, Industrial Safety,
and Environmental Programs

GJM/JTL:drf

cc: G. K. Isomura
M. W. Ellis

INFO on use
of copper
metal flakes in
launch grease



2929 Sixteenth Avenue S.W., Seattle, Washington 98134

Oct. 17, 1985

Mr. Dan Cargill
Washington Department of Ecology
4350 - 150th Ave. N.E.
Redmond, WA 98052

Subject: Launch Materials to be used on LSD-43

Dear Mr. Cargill,

This letter is to comply with your instructions given at the meeting with Brian Eccles, Launch Engineer, earlier this month.

Penwalt supplied the data sheets required indicating a 15% copper content in Slipcoat 10 and, according to Brian's calculations, we will be able to recover 90% of the product after launch. Please find his complete report attached.

Your cooperation and guidance with this project is greatly appreciated.

Sincerely,

A handwritten signature in dark ink, appearing to read "Greg Metzcus".

Greg Metzcus
Environmental Program
Coordinator

GM:fg

ANDREA BEATTY RINIKER
Director



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

4350 - 150th Ave. N.E. • Redmond, Washington 98052-5301 • (206) 885-1900

November 6, 1985

Mr. Greg Metzcus
Lockheed Shipbuilding Corp.
2929 Sixteenth Avenue S.W.
Seattle, Washington 98134

Launch Materials for LSD-43

Dear Mr. Metzcus:

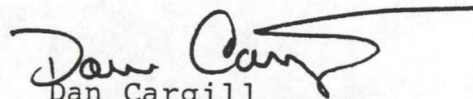
This is to acknowledge receipt of your letter of October 17, 1985, regarding the launching of LSD-43 and advise you of the sampling and analysis which should be conducted in order to assess the environmental effects of the materials used.

Specifically, the amount of slipcoat 10 applied should be compared with the projected use rate. Additionally, the quantity recovered after launching should be noted as well as an estimate of how much unrecoverable material remains on the ways, if any. Careful attention should be paid to limiting the quantity of other materials picked up during the recovery, so as to ensure that the weight or volume of the slipcoat 10 actually recovered is as accurate as possible.

Finally, an EP Toxicity should be run on the fresh material, as well as on recovered material to determine what effect, if any, weathering has on the material's toxicity.

If you have any questions or need further assistance, please do not hesitate to call.

Sincerely,


Dan Cargill
District Inspector
Environmental Quality

DC:gm

LOCKHEED SHIPBUILDING COMPANY
INTERDEPARTMENTAL COMMUNICATION

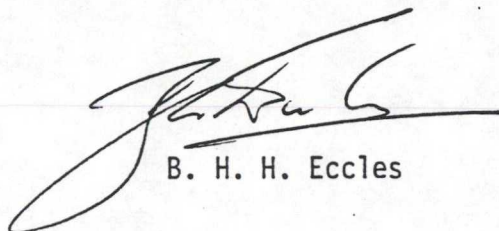
TO G. L. Metzcus DEPT./ 1140 BLDG./ 208 PLANT/ DATE 10/15/85
ORG. ZONE FAC.

FROM B. H. H. Eccles DEPT./ 1400 BLDG./ 101 PLANT/ EXT. 5587
ORG. ZONE FAC.

SUBJECT LSD-43 LAUNCH GREASE

Please find the following items enclosed for your variance submission to the Environmental Protection Agency.

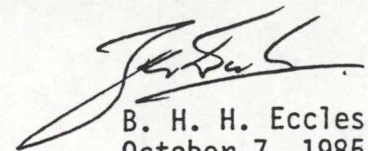
1. LSC description of grease application and estimate of quantity lost.
2. Material safety data sheets for Slipcoat 10, Slipcoat and Base Coat.


B. H. H. Eccles

BHHE:js
Enclosures

C.C.
R. VAN SLYKE.
R. ZACHARY.
J. QUINN.

HULLD



B. H. H. Eccles
October 7, 1985

LAUNCHING GREASE

The application of various greases is a necessary part of the launch process. Grease is applied between the ship and the ground to provide a reduced coefficient of friction between the surfaces. This allows the vessel to slide into the water. During this evolution, the ship is supported on a timber cradle secured to the hull with steel wires. The cradle comprises of 13 sliding ways, port and starboard, each sliding way being constructed from four (4) 12 x 12 timbers each 36' long.

Groundways are positioned on the shipway for the sliding ways to travel on during the launching sequence.

The grease is laid between the sliding ways and the groundways to reduce the friction between the timber surfaces.

The ship sits with the cradle in position for up to 4 months before launch and in order to keep the grease in place, 'grease irons', 6" x 1/4" MSFB, are laid between the sliding ways and groundways to prevent the weight of the cradle from squeezing out the grease. To stop the grease from seeping into the wood, both the sliding way sections and the groundways are spread with a base coat (wax). This base coat is not applied to the exposed portion of the groundways aft of the cradles.

Above the tide line a yellow, soap based, grease (slipcoat) is spread under the cradles and where exposed to the water, a copper based grease (slipcoat 10) is used. The exposed groundways receive a coat of copper grease (slipcoat 10) during the low tide period immediately before launch.

The application of grease is as follows:

- A. Base Coat - Base coat must be heated to a temperature high enough above the melting point of 150 degrees F. to allow for loss of heat while carrying the wax from the heating kettle to the ways for application. Recommended procedure is as follows:

Summer Time - During periods of clear weather and normal temperatures, heat the base coat to 200 degrees F. No base coat shall be applied to watersoaked ways (dry before application).

Winter Time - or during cold, rainy weather. Due to more rapid loss of heat while carrying the wax to the ways, it is necessary to heat the base coat to 250 degrees F. No base coat shall be applied to watersoaked ways (dry before application).

Methods of application

1. Using a 6" or 8" paint brush, apply a brush coat on the groundways to a 1/8" thickness. This can be done by dipping the brush into the container of melted base coat or by "brushing it out" as a quantity is poured on the ways.
2. Pour the melted base coat on the ways from a ladle or dipper, applying it with an upward motion. In this way the melted liquid base coat will have a change to "set" as it starts to run back down the ways.
3. Use an electric or other heated iron to remove excess quantities of base coat. Level the wax to a uniform thickness of 1/8".

4. On sliding ways, apply a brush coat of base coat 1/8" thick to prevent absorption of the slipcoat by the sliding ways.
5. Base coat shall be applied from fwd end of cradle section to Bent 89.

B. Slipcoat

Install the grease irons on top of the base coat on the groundways. The slipcoat, as it comes in the barrel, should be applied with a dipper or ladle to a minimum thickness of 1/4", level with the top of the grease irons. (See Detail 17-C). After the application of the slipcoat, the sliding ways are to be lowered onto the grease irons and excess grease removed. Grease application applies to both regular slipcoat and copper slipcoat (Slipcoat 10). Regular slipcoat shall be used from fwd cradle #1 through cradle section #10 and copper slipcoat shall be used from cradle section #11 to the end of the launching ways.

Estimate of extent of copper Slipcoat 10 used and recovered.

Area under sliding ways treated with Slipcoat 10 --

Sliding ways 11 thru 13 Port and Stbd

$$36'-3" \times 3 \times 2 = 217.5 \text{ lineal feet}$$

$$\text{Width of ways} = 4 \text{ feet}$$

$$\text{Thickness of Grease} = 1/4" \text{ minimum, use } 3/8" \text{ average}$$

$$217.5 \times 4 \times \frac{0.375}{12} = 27.2 \text{ Cubic Feet}$$

Area aft of sliding ways

$$\text{Distance from aft end of Cradle 13 to end of groundways} = 92 \text{ feet}$$

$$\text{Thickness of Grease} = 1/2" \text{ approx.}$$

$$\text{Volume} = 92 \times 4 \times 2 \times \frac{0.5}{12}$$

$$= 30.7 \text{ Cubic Feet}$$

$$\text{Total Volume} = 30.7 + 27.2 = 57.9 \text{ cubic feet}$$

$$57.9 \text{ ft}^3 @ \text{sg} = 0.9 = 57.9 + 62.43 \times 0.9$$

$$= 3253 \text{ lbs.} = 6-1/2 \text{ drums @ } 500\#/\text{drum}$$

Amount recovered after launch is expected to be of the order of 90%

$$3253 - 90\% = 325.3 \text{ lbs.}$$

From Material Safety Data Sheet for Slipcoat 10 dated 7/02/85

$$\text{Percentage of copper powder in Slipcoat 10} = <15\%$$

$$15\% \text{ of } 325.3 \text{ lbs.} = 48.8 \text{ lbs.}$$

Therefore, quantity of copper powder lost to the river is estimated to be approximately 50 lbs.